

No. XVII.—ORTHOPTERA, PHASMIDÆ OF THE SEYCHELLES.

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(With 2 Text-figures.)

(COMMUNICATED BY PROF. J. STANLEY GARDINER, M.A., F.R.S., F.L.S.)

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THE Phasmidæ brought from the Seychelles by the Percy Sladen Trust Expedition are remarkable firstly by the character of their local distribution within those islands. Out of the 6 species found there, 5 are peculiar to the Seychelles, and only 1 single species (*Phyllium bioculatum* Gray) is widely distributed. Now Mr Scott informs me that all the specimens of the 5 peculiar species (i.e. the *Carausius* and *Græffea*) collected by him, and among which are 3 new species, were found in the mountain-forests, most of them in the highest parts, among the endemic forest vegetation: on the other hand no *Phyllium* was found by him in the forests, but all those in the collection were given by residents or local collectors, who stated that these insects are found in the foliage of guava-bushes (*Psidium*), and perhaps of some other non-endemic plants in the lower cultivated country.

If we consider now the wider geographical distribution we see that all the species of *Phyllium* recorded from the Seychelles are found, outside that country and Mauritius, only in India, Ceylon, and the East Indies; and that, likewise, the genus *Carausius* has its centre of distribution in the Malay Archipelago, and extends also into India, Ceylon, the South of China, and Australia; while the genus *Græffea* has been hitherto recorded only from Australia, Celebes, New Guinea, Fiji, Society Islands and other localities in those regions †.

* The two authors' portions of the work are distinguished by their names being placed in brackets at the end of each of their several sections. The double authorship is explained as follows. A small but interesting series of Phasmidæ was collected by the "Sealark" Expedition in 1905. This material was worked out by Dr Bolivar, and sent back by him to Cambridge: he found among it a new species (*Carausius gardineri*), the description of which is included in this paper, and also two others (first obtained by Alluaud in 1892) which he had previously described in *Ann. Soc. Ent. France*, xiv. 1895, pp. 369—385. A much larger material was collected in 1908—9, and this was studied by M. Ferrière at the Cambridge University Museum in the autumn of 1911. He not only had before him the material determined by Dr Bolivar and the latter's manuscript, but he also visited the Hepe Department of the Oxford Museum in order to consult the fine collection of Phasmidæ preserved there. In the Seychelles collection of 1908—9, he referred a large number of specimens to the species already determined by Dr Bolivar, but he also described the two new species *Carausius scotti* and *Græffea seychellensis*. M. Ferrière has incorporated his own and Dr Bolivar's manuscripts into the present paper and written the introduction thereto. I have myself added certain particulars as to localities, habits, &c., and have also, with Dr Bolivar's permission, translated those parts of his manuscript which were written in French.—
HUGH SCOTT.

† The Indo-Australian affinities of the Seychelles Phasmidæ are commented on by Professor Kolbe in the introduction to his paper on "Die Coleopterenfauna der Seychellen," *Mitt. Zool. Mus. Berlin*, v, 1910, pp. 7 & 8.

The 4 Seychelles species of *Carausius* form within the limits of that genus a very definite group, being all of them distinguished by certain characters which separate them from the other members of the genus. They are the only representatives of the large tribe of the Lonchodini found outside the geographical area formed by the Oriental and part of the Australasian Regions.

On the other hand, of the Phasmidæ of East Africa and Madagascar, not a single representative was found in the Seychelles.

As for the genus *Græffea*, the discovery of a representative of it in the Seychelles, so far removed from the centre of distribution of the genus, is a remarkable fact. (*C. Ferrière.*)

Tribe **Phyllini.**

PHYLLIUM Illiger, Käf. Preuss. p. 499, 1798.

1. *Phyllium bioculatum* Gray, in Griffith's Animal Kingdom, vol. xv. (Ins. ii.), p. 191, pl. 63, fig. 3, 1832; Bolivar, Ann. Soc. Ent. France, vol. lxiv. p. 374, 1895; Brunner and Redtenbacher, Die Insektenfam. der Phasm., p. 174, 1906.

Loc. Seychelles. Silhouette, 1908: 1 adult and 1 immature ♂, 1 adult and several immature ♀. Mahé: 4 adult ♀, and a number of immature ♀ in various stages of development, and eggs; one of the adult ♀ was marked (when alive) with patches of reddish colour on the femora, tibiæ, the large nervures of the tegmina, and the abdomen; the other adult ♀ were almost uniform green. None of the specimens were found in the high mountain-forests. Also known from Mauritius, India, Ceylon, Java, Sumatra, Borneo.

NOTE. Three other species of *Phyllium* have been recorded from the Seychelles: *P. gelonus* Gray, also known from Ceylon and the East Indies: *P. celebicum* de Haan, also recorded from Burmah, Philippine Is., Celebes, &c.: and *P. siccifolium* Linnaeus, also recorded from Mauritius, India, Indo-China, Philippine Is., Moluccas, &c.: see Brunner and Redtenbacher, *op. cit.* pp. 174, 175 and 176. None of these were obtained by the Percy Sladen Trust Expedition. (*C. Ferrière.*)

Tribe **Lonchodini.**

CARAUSIUS Stål, Rec. Orth. iii. p. 8, 1875.

2. *Carausius alluaudi* (Bolivar).

Lonchodes alluaudi Bolivar, Ann. Soc. Ent. France, vol. lxiv. p. 372, 1895.

Carausius alluaudi Brunner and Redtenbacher, Die Insektenfam. der Phasm., p. 274, pl. 12, fig. 6 b (♂), 1907.

The fact that the length of the intermediate femora compared with that of the metanotum brings this species near to the genus *Lonchodes*, made me originally decide to place this species in that genus rather than in *Carausius*. This character distinguishes all the Seychelles species from the rest of the species of *Carausius*. Redtenbacher was wrong in ascribing to this species the character "femora omnia apice subtus mutica." It can be seen that I said in my original description "femora omnia inermia, tantum subtus ante aream apicalem bidentata." (*I. Bolivar.*)

Loc. Seychelles. La Digne (Alluaud). Silhouette; high damp forest, about 2000 feet, VIII. 1908, 1 ♂. Mahé; 1905, 3 ♂, 1 ♀ (Gardiner); forest near Morne Blanc, X—XI. 1908, 2 ♂, 4 ♀; forest above Cascade Estate, several ♂ and 2 ♀. In the high jungle above Cascade, 23. I. 1909, 6 ♂ were found clasping (with the lobes of the anal segment) a single ♀ at various points on the underside of the abdomen; a 7th ♂ was close by. When alive the adult ♂ were conspicuously reddish, while the adult ♀ are greyish-brown (Scott).

3. *Carausius sechellensis* (Bolivar).

Lonchodes sechellensis Bolivar, Ann. Soc. Ent. France, vol. lxiv. p. 373, 1895.

Carausius sechellensis Brunner and Redtenbacher, Die Insektenfam. der Phasm., p. 274, pl. xii. fig. 6 a (♀), 1907.

This species was originally described by Dr Bolivar from specimens obtained in Mahé by M. Alluaud in 1892. A single ♂ and 2 ♀, obtained in Mahé and Praslin in 1905 by Professor Stanley Gardiner, were considered by Dr Bolivar to be a new species, which he called in his MS. *C. bicornutus*. His description of this proposed new species is as follows:—

“*Carausius bicornutus*, sp. nov.

Lonchodes sechellensis Bolivar, Ann. Soc. Ent. France, vol. lxiv. (1895), p. 373, ♀ (hand ♂).

Carausius sechellensis Brunner et Redtenbacher, Die Insektenfam. der Phasm. 1907, p. 274, ♂ (Tab. 12, fig. 6 a, ♀).

Caput inter oculos bispinosum ♂ et ♀ nec non occipite biseriato-tuberculato-spinoso. Pronotum antice bispinulosum, in ♂ granulosum in ♀ spinulosum. Mesonotum atque metanotum in ♂ minus triquetra quam in ♀, granulosa, carinis lateralibus denticulatis, in ♀ spinosis. Femora intermedia et postica subtus apice utrinque unidentata, carina media inermi; intermedia metanoto cum segmento mediano longiora. Tibiæ normales, carina media inferne prope basin obtuse et breviter angulata. Segmentum anale ♂ tectiforme, triangulariter et breviter emarginatum; lobis parvis, intus dentibus nigris seriatis instructis. Lamina subgenitalis transverse subcarinata, carina medio subgibbosa. Segmentum anale ♀ semicirculariter sinuatum. Lamina supraanalis parva, trigona, apposita. Abdomen subtus linea media plus minusve granosa.

Long. corp.	♂ 68	..... ♀ 87
„ mes.	18	..... 22
„ metan. c. segm. m. ...	12	..... 13
„ segm. m.	2,5	..... 2,8
„ femor. ant.	21	..... 22
„ „ interm.	15	..... 16
„ „ post.	18	..... 18.”

It will be seen from the above that Dr Bolivar thought that the ♀ previously described as *C. sechellensis* should be referred to the proposed new species (*C. bicornutus*), while the ♂ previously described as *C. sechellensis* should remain under that name: so

that *C. sechellensis* would remain as a species of which only the ♂ is known. I have had for examination a much larger material, consisting of a number of ♂ and ♀ obtained in 1908—9, in addition to those obtained in 1905. An examination of this series has convinced me that it is impossible to separate *C. sechellensis* from *C. bicornutus* ♂. According to Bolivar's description given above, *C. bicornutus* ♂ differs from *C. sechellensis* only in having two spines on the head between the eyes, shorter lobes on the anal segment, the subanal lamina transversely carinate, and in having no tooth at the base of the tibiæ. But in the series of ♂ before me, the spines between the eyes vary much in length and in some cases are very little developed; the length of the lobes and the form of the subanal lamina also vary from one individual to another. These small characters vary independently of one another. As to the little tooth said to be present at the base of the tibia in *C. sechellensis*, I have been unable to see it in any specimen. I consider that the differences are only of the nature of individual variation, and quite insufficient to separate the series into two species; I therefore retain all the specimens under the name *C. sechellensis* Bolivar. (*C. Ferrière*.)

Loc. Seychelles. Silhouette: high damp forest near Mont Pot-à-eau, about 2000 ft., VIII. 1908, 1 ♂; near Mare aux Cochons, IX. 1908, 4 ♂ and 3 ♀ (including a ♂ and a ♀ taken *in coitu* at night on a wild pineapple-plant). Mahé: 1 ♂, 1 ♀, and 1 immature ♀, 1905 (Gardiner); near Morne Blanc, Cascade Estate, and other localities, 1908—9, 2 adult ♂ and 6 immature ♂. Praslin: XI—XII. 1908, 1 very large ♂, and 1 ♀; 1905, 1 ♀ (Gardiner). Félicité: 14—18. XII. 1908, 2 ♂, 2 ♀.

4. *Carausius gardineri*, sp. nov.

Caput muticum, subelongatum, retrorsum subangustatum, antice vix pone antennas transverse impressum; postice binodosum. Pronotum læve, sulcatum. Mesonotum et metanotum tectiformia, in ♂ gracilia, marginibus parallelis, in ♀ antice subangustata, in ♀ tantum granulosa, marginibus haud dentatis sed granulis callosis, parvis, præcipue in metanoto distinctis. Femora omnia inermia, subtus prope apicem nec lobata nec dentata; femora intermedia metanoto cum segmento mediano distincte ♂ vel vix ♀ longiora. Abdomen granulose. Segmentum anale ♂ compresso-tectiforme, postice profunde fissum, lobis elongatis, intus denticulis nigris munitis. Segmentum anale ♀ late triangulariter emarginatum, lobis obtusis. Lamina supraanalis parva, subtrigono-rotundata. Segmentum abdominale ventrale septimum ♀ apice medio callosum et angulariter productum, fuscum.

Long. corp.	♂ 52	..... ♀ 64
„ meson.	13	..... 17
„ metan. c. segm. m. ...	9,8	..... 11,5
„ segm. m.	1,5	..... 2
„ fem. ant.	14,5	..... 16
„ „ interm.	11	..... 11,5
„ „ post.	13	..... 14

This new species of *Carausius* from the Seychelles must be placed near the other species which are found in the same islands, on account of the form of the upper side of

the body, which is elevated in the manner of a roof (though this character is less strongly marked than in the other species); and on account of the intermediate femora in the ♂ being markedly longer than the metanotum and median segment together, while in the ♀ they are almost of the same length. This is the only Seychelles species in which the femora are quite unarmed. (*I. Bolivar.*)

Loc. Seychelles. Mahé: Morne Seychellois, 1905, 2 ♂, 2 ♀ (Gardiner); 1905, exact locality unrecorded, 2 ♀; high forest near Morne Blanc, X—XI. 1908, 7 ♂, 3 ♀, and 2 immature ♀; Cascade Estate, 1908—9, 1 ♂; 1908—9, exact locality unrecorded, 1 ♂, 3 ♀. Silhouette: from high forest near Mont Pot-à-eau, some from 2000 feet or more, VIII. 1908, 6 ♂, 2 ♀, and 1 immature ♀. This is a typically mountain-forest species: the ♂, which are usually very dark in colour, were frequently swept from beds of fern in the high damp forests: the adult ♀ were brown when alive (Scott).

5. *Carausius scotti*, sp. nov. (Fig. 1.)

♂. Caput inter oculos bispinosum, postice bituberculatum. Antennæ nigræ, pedibus anterioribus longiores. Pronotum utrinque 3-spinosum. Mesonotum tectiforme, tuberculis aliquibus sparsis instructum, atque postice 4-spinosum. Metanotum læve, postice bispinosum. Segmentum medianum et segmenta abdominis 2—8 postice bispinosa; segmenta 9 et 10 haud spinosa. Segmentum anale compresso-tectiforme, lobis parvis. Lamina subgenitalis in modo ejus *C. albuaudi* constructa. Femora omnia inermia, intermedia et postica ante aream apicalem subtus bidentata: intermedia metanoto cum segmento mediano longiora.

Long. corp. 78 mm. pron. 3. meson. 21. metan. cum segm. med. $14\frac{1}{2}$. segm. med. $2\frac{1}{2}$. abdom. 38. fem. ant. 24. fem. int. 17. fem. post. 20.

Yellowish-brown; black at the articulations. Head short, dark brown, with two spines between the eyes and two smaller spines on the occiput. Antennæ black, longer than the front legs. Pronotum dark, with six little spines, regularly placed in two series, the two front ones longer. Mesonotum roof-like, parallel-sided, with only a few tubercles and four spines near the posterior end, of which the two anterior are nearer the middle line and longer. Mesosternum keeled and smooth. Metanotum smooth, with two spines closely approximated near the posterior end. Median segment and the following abdominal segments except the two last, each with two spines at the hind end, the spines becoming gradually smaller towards the extremity of the abdomen. Abdomen narrow, suddenly enlarged between the 8th and 9th segments. Anal segment roof-like, compressed; lobes short, provided inside with little black teeth. Cerci short. Subanal lamina gibbous with the posterior edge truncate and sinuate. Front femora unarmed, longer than the mesonotum. Intermediate and posterior femora provided at the apex with two little teeth. Intermediate femora longer than the metanotum and the median segment together. Tibiæ all unarmed.

This single specimen has a peculiar and remarkable aspect owing to the presence of the black spines regularly placed in pairs at the posterior end of each segment (except the two last), and to the yellowish-brown colour passing to black at the articulations of the body and legs. It comes near the other Seychelles species of *Carausius* in the

roof-like form of the body,—less visible on the abdomen—its long black antennæ, the form of the anal segment and the subanal lamina, and the two little teeth at the apex of the intermediate and posterior femora, which teeth are found also in *C. alluaudi* and *C. sechellensis*.

This species is dedicated to Mr Hugh Scott. (*C. Ferrière*.)

Loc. Seychelles. Silhouette: high damp forest near Mont Pot-à-eau, VIII. 1908, 1 ♂.

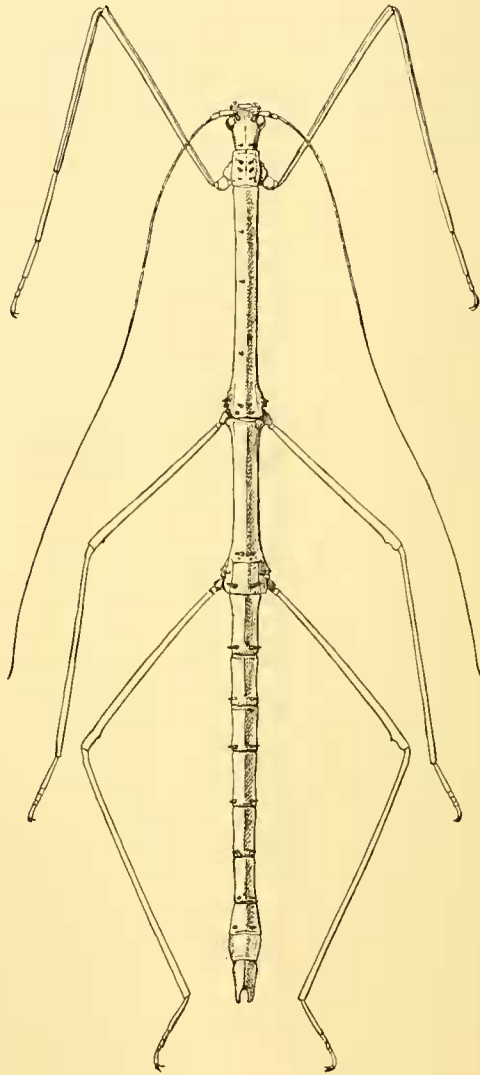


Fig. 1. *Carausius scotti*, ♂; $\times 1\frac{1}{2}$.

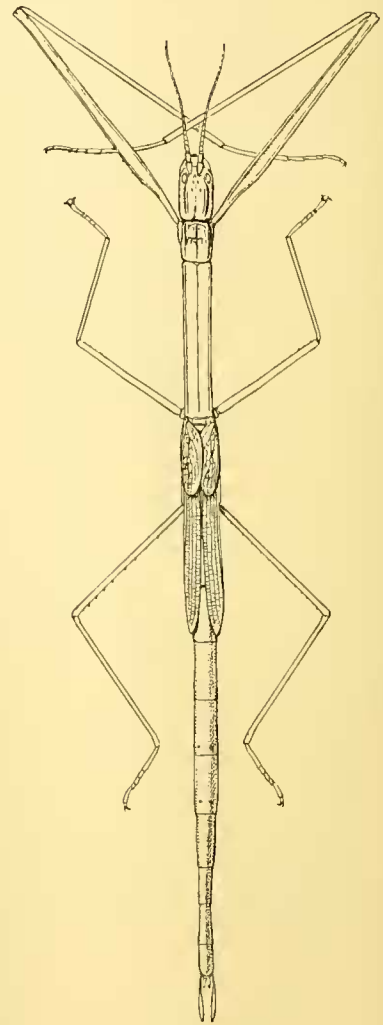


Fig. 2. *Graeffea sechellensis*, ♀; natural size.

NOTE. The collection contains a number of immature specimens of *Carausius*, the species of which cannot be determined. Many of these were green when caught, and were swept from beds of fern in the high damp forests, often together with the little dark males of *C. gardineri*.

Tribe **Phibalosomini**. Section **Platycraniæ**.

GRAEFFEA Brunner, in Dr Graeffe, Reisen im Innern der Insel Viti Levu, p. 46, 1868 ; Brunner and Redtenbacher, Die Insektenfam. der Phasm., p. 370, 1908.

6. *Graeffea seychellensis*, sp. nov. (Fig. 2.)

♀. Caput elongatum, læve. Pronotum et mesonotum læve. Segmentum medianum longius metanoto. Elytra ovata, marginem posticum segmenti mediani haud attingentia. Alæ elongatæ, segmentum 4 abdominis vix attingentes; areâ posticâ hyalinâ, ad marginem exteriorem vix roseâ. Cerci elongati, lanceolati. Operculum elongatum, acuminatum, abdomen vix superans. Femora inermia, carinâ inferâ medianâ subtiliter denticulatâ.

Long. corp. 106 mm. antenn. $16\frac{1}{2}$. cap. post antenn. $5\frac{1}{2}$. pron. $5\frac{1}{2}$. meson. 20. metan. cum segm. med. 12. segm. med. 7. abdom. 59. cerc. 8. elytror. 9. alar. 24. fem. ant. 34. fem. int. 16. fem. post. 20.

Reddish-brown, with dark irregular spots. Head light reddish-brown, with longitudinal dark lines, lighter on the cheeks and the occiput, elongate, smooth, with a fine longitudinal groove behind each eye, small eyes and large cheeks. Antennæ dark, distinctly articulated, shorter than the front femora. Prothorax short; prosternum almost as long as broad. Mesonotum dark-spotted, smooth, elongate, slightly wider in front. Median segment longer than the metanotum. Abdomen elongate, segments nearly $2\frac{1}{2}$ times as long as broad, the three last not much shorter. Anal segment with a small median longitudinal keel. Cerci long, narrow, lanceolate. Operculum boat-shaped, elongate and pointed, extending very little beyond the extremity of the abdomen. The lower valvulæ of the ovipositor are filiform. Elytra oval, not extending to the posterior end of the median segment: veins well-marked, light on the dark-brown ground. Wings long, reaching nearly to the posterior edge of the 4th abdominal segment: posterior part transparent, slightly rose-coloured at the outer margin. Front femora bent at the base; with four carinæ, of which the two upper ones are very near together and smooth. The lower and inner carina is slightly notched in all the femora. Tibiæ all unarmed. Front tarsi much elongate. (*C. Ferrière*.)

Loc. Seychelles. Silhouette: 1 adult ♀ beaten from a native palm (*Stevensonia*) in the high forest above Mare aux Cochons, 27. IX. 1908; 1 immature ♀ from high damp forest near Mont Pot-à-eau, about 2000 ft., VIII. 1908. Mahé: 1 adult ♀ and several very young ♀ from high forest near Morne Blanc, X—XI. 1908; Cascade Estate, 1 immature ♀, 1908—9. Praslin: 1 immature ♀, XI—XII. 1908. The very young specimens were bright green when alive, two of the youngest with a dark median longitudinal stripe on the thorax and abdomen. The colour of the adults is described above (from the dried specimens) as reddish-brown, but during life was probably greyer (Scott).

The genus *Graeffea* till now has been found only in the Polynesian islands. It is therefore interesting to find it represented in the Seychelles, so far from its geographical

centre. The fact that it has not been found either in the East Indies or in Ceylon makes its presence in the Seychelles more curious.

That this species is a true *Græffea* seems to me to be quite clear from a consideration of its various characters. In general structure it resembles *G. lifuensis* Sharp (in A. Willey's "Zoological Results," Part I, 1898, p. 86, pl. 9, fig. 21), the type ♀ of which I have examined in the Cambridge University Museum; but differs from it by its more slender form, its smooth mesonotum and by the much more developed elytra and wings. (*C. Ferrière.*)